

Inspired by ‘Back to the Future,’ this Machine Turns Food Waste into Energy

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BY **DANIEL RASMUS** on September 27, 2015 at 3:58 pm

Many people in the Northwest separate out their table scraps, wilted leaves and old fruit, carting them off eventually to a compost bin or joining their grass clippings and pruning remains in the green waste bin. In the City of Seattle, food waste is **required to be separated from garbage**.

But most of our actions still revolve around a simple concept: Collect your household waste, sit it on the curb, and somebody will come and pick it up. Businesses do the same thing, just on a larger scale. We have applied industrial-age logic to waste: create a production line that starts at a home or business, automate as many of the tasks as possible, and coordinate through centrally managed processes and destinations.

This centralized approach to waste collection is labor and energy intensive, and it doesn't give back much.



Back to the Future's 'Mr. Fusion' converted waste into energy, replacing plutonium as the source of power for the DeLorean's flux capacitor.

Along comes the HORSE, an acronym for High-solids Organic-waste Recycling System with Electrical Output — a machine that offers local waste reclamation as well as energy and high-grade fertilizer to its owners.

I heard about the HORSE from one my MBA students at Seattle's Pinchot University. Srirup Kumar, President of **Community Supported Biocycling**, or CSB, **recently**

launched a [Kickstarter campaign](#) with Jan Allen, president of [Impact Bioenergy](#), to bring HORSE to market and make its case. Srirup and his team were clearly inspired by the modified flux capacitor at the end of the first *Back to the Future* movie that runs on trash. While time travel remains impossible, charging a Nissan Leaf from fermented kale can be achieved today.

While time travel remains impossible, charging a Nisan Leaf from fermented kale can be achieved today. But HORSE isn't just about kale or salad. The unit can recycle a wide variety of organic waste, including kitchen trim, post-consumer dining-room food scraps, meat, grease, oil, all edible liquids, seafood, dairy products, starch, sugar, fruit, vegetable, small bones, soiled paper products, napkins, tissue, paper towels, waxed paper, grass clippings, leaves, fats, fryer oil, grease trap waste, beverages, alcohol, soup, condiments, eggshells and glycerin. But as their Kickstarter states, if a real horse can't eat it, don't put it into the HORSE.

The CSB team sees urban farmers, restaurants, craft food or beverage producers, food banks, as well as schools and college campuses as primary targets. All of those pizza crusts and the liquified vegetable material in dorm room refrigerators combined with the wealth of refuse from dining halls create the perfect ingestibles for a HORSE. According to their Kickstarter site, a HORSE will generate 5,400 gallons per year of liquid fertilizer and up to 37 MW-hrs of raw energy. At full capacity, that is 68,700 hours of refrigerator time for cold college beer, or 10,700 miles in a Tesla S for the college student who dropped out and hit it big with her first app.



The CSB and Impact Bioenergy team: Srirup Kumar, Michael Smith, Jan Allen, and Pete Agtuca.

In a conversation with CSB President and Co-Founder, we dug into their motivations, the technical issues and the business of recycling organic waste.

In developing this HORSE, Kumar says, “We wanted to support local food systems, stop pollution, reduce climate change and make money doing it by investing in the organic movement! One might say, our motivation was simply to be forward-thinking, locally.”



A HORSE being delivered for testing

He adds, “Energy efficiency and resource recovery are the lowest hanging fruit that grow back. In this case, the fruit is so low it is going to waste, literally. Since we actually pay to waste, turning it into resource is a no-brainer. The bar is pretty low when we send our money to the landfill.”

But the HORSE isn’t just about technology. “This is also about justice. Social justice. Food justice. Environmental justice. Energy justice. Only possible through democratization of the waste cycle.”

As they were designing the project, Kumar shared that this was very different than typical technology projects that usually focus on digital technology. While the HORSE does include digital controls, the real challenge was to “make it easy and convenient to service the microdigester and keep it healthy. The HORSE needs to graze throughout the day, just like a real cow or horse.”

Businesses adopting the HORSE need to give it “a balanced diet and some TLC, but much less than a real cow or horse.”

I had to ask if the system creates an odor, and it appears that the system does have many similarities with the mammalian digestive process. “Internally, yes, there are odors generated. But the external smell depends on how many layers of odor control are used. We are fitting the equipment into air-tight shipping containers and offer additional odor control technologies such as atomizers and a greenhouse to capture gas. In the end, this is an organic process. Biology smells — most of the time at least — but we are engineering this to be a technology you wont mind sitting next to your business.”

The businesses that will benefit most include, “any organization with a lot of food or beverage waste. For urban farmers we can help extend their growing season through the winter with our off-grid heat and power production for a greenhouse. By taking the truck out of local food systems, it turns out light transport businesses like cargo bicycle/tricycle companies may really benefit from the technology. One transport service recently told us this is their holy grail: ‘not only do you give us something to pick up after making a delivery, therefore filling empty capacity, but we can power our vehicles off-grid, from waste-to-wheels!’ We think of this as our HORSE and carriage solution. Electric vehicle applications end up with a negative carbon footprint.”

Kumar shared that, “we’ve done some calculations and it looks like we can talk about miles-per-pound. We think its pretty fabulous that the HORSE generates one mile’s worth of electricity for a basic electric vehicle for each pound of waste input into the system.”

Over the next year, CSB wants to wrap up their pilot, apply their lessons learned and scale the business by ten times the pilot. They see “cross-pollination to regions beyond the Pacific Northwest.” Food waste is universal,” Kumar says, “so we want to cast a wide net to become the ultimate last stop instead of the landfill.”

While there are plans for a home use for the HORSE, its current design requires around 135 lbs. of organic residuals per day. Kumar explains, “Currently, our smallest system is designed for 25 tons per year. Around 50 people could generate that amount of food waste so at the residential level it is more suited to a condo complex, neighborhood or garden.”

Each HORSE prototype costs about \$43,300. The [\\$30,000 Kickstarter](#) should give birth to one HORSE that will help the partnership refine their engineering and test their support model, as well as their economics. HORSE is built in Auburn, Wash., south of Seattle.



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